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jc525 U.S. PTO 09/219518 12/23/98

23 December 1998

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jc598 U.S. PTO 12/23/98

Assistant Commissioner for Patents
Washington, D.C. 20231

Attorney Docket: P55492

Sir:

Submitted herewith is the following patent application:

Inventor: **Jae-Yong BAE**

Title: **TOUCH PAD MOUNTING DEVICE FOR AN ELECTRONIC SYSTEM**

Please find attached hereto an application for patent which includes: Specification and Abstract, Claims, original Declaration And Power of Attorney, Assignment, and a certified copy of the foreign priority document identified below:

Verified Showing of Small Entity Status: No

Drawings: Formal drawings, 7 sheets, Figures 1 through 8

Claim of priority under 35 U.S.C. §119: **YES**
**REPUBLIC OF KOREA Application No. 97-73686 filed on 24 December 1997

Fee (see formula below): CHECK ENCLOSED (#26456 & #26457)

Basic Fee $380/760	$760.00
Additional Fees:	
Total number of claims in excess of 20 0 times $9/18	$0.00
Number of independent claims in excess of 3: 0 times $39/78	$0.00
Multiple Dependent Claims $135/270	$0.00
An Assignment is likewise enclosed: Recording Fee $40	$40.00
Filing Non-English specification	$0.00
TOTAL FEES FOR THE ABOVE APPLICATION	*$800.00*

Docket No.: P55492

Inventor: **Jae-Yong BAE**

Title: **TOUCH PAD MOUNTING DEVICE FOR AN ELECTRONIC SYSTEM**

Assistant Commissioner is authorized to charge our Deposit Account No. 02-4943 for any **additional charges** necessary towards payment of the filing fee for the above-referenced application. Please notify the undersigned attorney of any transaction regarding our Deposit Account.

In view of the above, it is requested that this application be accorded a filing date pursuant to 37 CFR 1.53(b).

Please address all correspondence to:

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Suite 300
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Respectfully submitted,

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REB/RGZ/mf

PTO/SB/17 (2/98)
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FEE TRANSMITTAL

Patent fees are subject to annual revision on October 1.
These are the fees effective October 1, 1997.
Small Entity payments must be supported by a small entity statement, otherwise large entity fees must be paid. *See* Forms PTO/SB/09-12.
See 37 C.F.R. §§1.27 and 1.28.

Complete If Known	
Application Number	*to be assigned*
Filing Date	23 December 1998
First Named Inventor	Jae-Yong BAE
Examiner Name	*to be assigned*
Group/Art Unit	*to be assigned*
Attorney Docket No.	P55492

TOTAL AMOUNT OF PAYMENT	($) 800.00

METHOD OF PAYMENT (check one)

1. ☐ The Commissioner is hereby authorized to charge indicated fees and credit any over payments to:

Deposit Account Number: 02-4943
Deposit Account Number: _____

☐ Charge Any Additional Fee Required Under 37 C.F.R. §1.16 and 1.17.
☐ Charge the Issue Fee Set in 37 C.F.R. §1.18 at the Mailing of the Notice of Allowance.

2. ■ **Payment Enclosed: (CHECK #26456 & #26457)**
■ Check ☐ Money Order ☐ Other

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
101	760	201	380	Utility filing fee	$ 760.00
106	310	206	155	Design filing fee	$
107	480	207	240	Plant filing fee	$
108	760	208	380	Reissue filing fee	$
114	150	214	75	Provisional filing fee	$
				SUBTOTAL (1)	($) 760.00

2. EXTRA CLAIM FEES

	Extra Claims		Fee from below		Fee Paid
Total claims	-20** =		x	=	
Independent Claims	-3** =		x	=	
Multiple Dependent				=	

** *or number previously paid, if greater; For Reissues, see below*

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
103	18	203	9	**Claims in excess of 20**
102	78	202	39	**Independent claims in excess of 3**
104	260	204	130	**Multiple dependent claim, if not paid**
109	78	209	39	** **Reissue independent claims over original patent**
110	18	210	9	** **Reissue claims in excess of 20 and over original patent**

SUBTOTAL (2) ($) 0.00

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
105	130	205	65	Surcharge-late filing fee or oath	$
127	50	227	25	Surcharge-late provisional filing fee or cover sheet	$
139	130	139	130	Non-English specification	$
147	2,520	147	2,520	For filing a request for reexamination	$
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	$
113	1,840 *	113	1,840*	Requesting publication of SIR after Examiner action	$
115	110	215	55	Extension for reply within first month	$
116	380	216	190	Extension for reply within second month	$
117	870	217	435	Extension for reply within third month	$
118	1,360	218	680	Extension for reply within fourth month	$
128	1,850	228	925	Extension for reply within fifth month	$
119	300	219	150	Notice of Appeal	$
120	300	220	150	Filing a brief in support of an appeal	$
121	260	221	130	Request for oral hearing	$
138	1,510	138	1,510	Petition to institute a public use proceeding	$
140	110	240	55	Petition to revive - unavoidable	$
141	1,210	241	605	Petition to revive - unintentional	$
142	1,210	242	605	Utility issue fee (or reissue)	$
143	430	243	215	Design issue fee	$
144	580	244	290	Plant issue fee	$
122	130	122	130	Petitions to the Commissioner	$
123	50	123	50	Petitions related to provisional applications	$
126	240	126	240	Submission of Information Disclosure Statement	$
581	40	581	40	Recording each patent assignment per property (Times number of properties)	$
146	760	246	380	Filing a submission after final rejection (37 C.F.R. §1.129(a))	$
149	760	249	380	For each additional invention to be examined (37 C.F.R. §1.129(b))	$

Other Fee (specify) Assignment $40.00

Other Fee (specify) _____ $

** Reduced by Basic Filing Fee Paid

SUBTOTAL (3) **$40.00**

SUBMITTED BY

Typed or Printed Name	Robert E. Bushnell, Esq.			Complete (if applicable) Reg. Number	27,774
Signature		Date	23 December 1998	Deposit Account User ID	

REB/mf

TITLE OF THE INVENTION

TOUCH PAD MOUNTING DEVICE FOR AN ELECTRONIC SYSTEM

CLAIM OF PRIORITY

This application makes reference to, incorporates the same herein, and claims all rights accruing thereto under 35 U.S.C. §119 through my patent application entitled *Contrivance for Mounting a Pointing Device in an Electronic System* earlier filed in the Korean Industrial Property Office on the 24th day of December 1997 and there duly assigned Serial No. 1997/73686.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention concerns a device for mounting a cursor movement control device in an electronic system such as computer and, more specifically, to a device for mounting a touch pad device in a portable computer.

Background Art

Various electromechanical devices are known in the art for effecting the movement of a cursor on a display device using control signals. For example, so-called "joy-sticks" are frequently used with computing equipment to move a cursor, or another image, that is displayed on the face of the display device. A typical joy-stick operates by producing control signals by means of electrical

potentiometers linked to the movable actuating rod where the magnitude of the signal determines the rate of motion and the polarity of the signal determines the direction of cursor movement. Another well known device is the so-called "track ball". The track ball has a spherical member is mounted in a socket that allows the spherical member to rotate about any axis. By rotating the track ball control signals are generated that direct the motion of a cursor, or another image, along the face of a display device. Similar to the track ball is the so-called "mouse" that has a spherical member covered by a palm-sized housing. By pushing the palm-sized housing along a supporting surface the spherical member is rotated and signals are sent to the computer that control the motion of a cursor, or another image, along the face of a display device.

More recently developed than the above devices is the "touch pad". The touch pad allows a user to manipulate the position of a cursor, or another image, along the face of a display device by sliding a finger over the surface of the touch-pad. The touch pad can be made using a printed circuit board that has a pattern of conductors formed in a grid, using a predetermined spacing, that may is juxtaposed with a flexible plastic insulating layer having a pattern of metallization on the under surface. By depressing the flexible layer against the underlying printed circuit grid, signals are produced that are directly related to the particular point on the pad that is being touched.

A touch pad may be designed with several buttons that function similarly to the right and left buttons of a mouse. In the process of mounting a touch pad onto the housing of a portable computer, the touch pad plate is placed against the plastic housing and covered by a plastic mounting case. To protect the touch pad from electromagnetic interference it is necessary to plate the plastic case prior to using the plastic case to support the touch pad plate. The plating process, however, generates

contaminants and can adversely affect the workers in the manufacturing facility where the touch pad device is produced. In addition, the use of the plastic mounting case, in addition to the plated metal, increases the weight of the portable computer and causes the thickness of the touch pad unit to be increased, thus restricting the design flexibility of the portable computer.

As such, I believe that it may be possible to improve on the contemporary art by providing a touch pad mounting device that does not require a plating process, that eliminates the use of a plastic case to support the touch pad device, that reduces the thickness of the touch pad unit, that increases the safety of workers in facilities that assemble the touch pads, and that reduces the weight of electrical systems that use the touch pad mounting device.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide an improved touch pad mounting device.

It is another object to provide a touch pad mounting device that does not require a plating process, thus increasing the safety of workers in facilities that produce touch pad devices.

It is still another object to provide a touch pad mounting device that eliminates the use of a plastic case to support the touch pad device.

It is yet another object to provide a touch pad mounting device that reduces the thickness of the touch pad unit.

It is still yet another object to provide a touch pad mounting device that reduces the weight of electrical systems that use the touch pad mounting device.

To achieve these and other objects a device for mounting a touch pad in an electronic system may be constructed using an opening formed in the housing to expose the touch pad that is attached to the inner surface of the housing. A plurality of lugs are formed on the inside of the housing around the opening to engage the touch pad supporting case that secures the touch pad to the housing. The touch pad supporting case is made of a metallic material and is free from any plastics. This allows the touch pad unit to be thinner and lighter and avoids the need for performing a plating process on a plastic touch pad supporting case. This removes a safety hazard at manufacturing plants by avoiding exposing workers to the contaminants generated by the plating process.

According to another embodiment of the present invention, a device for mounting a touch pad with a selective button set, or a plurality of buttons, to input a selection signal in an electronic system such as notebook computer having a system unit mounted in a housing may be constructed using a second opening formed in the housing to expose selective button set along with the touch pad structure described above. Plugs are formed on the inside of the housing near the selective button set mounting opening, and slots are formed in one end region of the selective button set. The selective button set is directly mounted in the second opening by means of the plugs fixedly being inserted into the slots of the selective button set. Preferably, the selective button set includes a first and a second selective button, and the selective button set mounting opening, or second opening, includes a first and a second opening part for respectively receiving the first and second selective buttons. In addition, a button stopper is further provided between the first and second opening parts to limit the downward movement of the first and second selective buttons.

The metal plate to fixedly mount the touch pad serves to shield electromagnetic interferences.

It may be preferably made of a thin stainless steel plate with a thickness less than one millimeter to strengthen the device as well as reduce the weight and thickness of the housing.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete appreciation of this invention, and many of the attendant advantages thereof, will be readily apparent as the same becomes better understood by reference to the following detailed description when considered in conjunction with the accompanying drawings in which like reference symbols indicate the same or similar components, wherein:

Fig. 1 is a perspective view illustrating a notebook computer;

Fig. 2 is an exploded view illustrating the mounting of a touch pad in a notebook computer;

Fig. 3 is an exploded view illustrating a device as constructed according to the principles of the present invention for mounting a touch pad with a selective button set in a notebook computer;

Fig. 4 is a cross sectional view taken along line A-A' of Fig. 3;

Fig. 5 is a plane view illustrating the inner surface of the housing of the electronic system to which the touch pad is mounted along with the selective button set;

Fig. 6 is a view showing the touch pad and selective button set mounted to the inner surface of the housing of the electronic system;

Fig. 7 is a partial cross sectional view taken along line B-B' of Fig. 6;

Fig. 8 is a partial cross sectional view taken along line C-C' of Fig. 6;

Fig. 9A is a partial cross sectional view illustrating the position of the first and second selective buttons when they are not externally pressed; and

Fig. 9B is a partial cross sectional view illustrating the position of the first and second selective buttons when they are externally pressed.

DETAILED DESCRIPTION OF THE DRAWINGS

Turning now to the drawings, Fig. 1 illustrates notebook computer 10 that may be constructed using system unit 12 and display panel 14. Generally, the housing of system unit 12 is provided with a keyboard and touch pad 16 with selective button set 18 working like the right and left buttons of a mouse. Before mounting touch pad 16, touch pad plate 24 is placed, as shown in Fig. 2, on plastic mounting case 26, which is fixedly mounted to housing 13 by means of screws 28 that are inserted into bosses 22 that are formed on housing 13. Plastic mounting case 26 must be plated to shield electromagnetic interferences.

Figs. 3 through 5 illustrate a device for mounting touch pads as constructed according to the principles of the present invention. Housing 30 of the system unit, or base, of a notebook computer is provided with a touch pad mounting opening, also referred to in the claims as an opening or a first opening, 32, around which fixing projections such as lugs and bosses are formed to hold metal plate, also referred to as a touch pad supporting case in the claims, 60. Metal plate 60 secures touch pad 50 onto the inside of the housing towards the touch pad mounting opening 32. In addition, selective button set, also referred to in the claims as a plurality of buttons, 92 is mounted in a selective button set mounting opening, also referred to in the claims as a second opening, 90 formed adjacent to the touch pad mounting opening in the housing, so that the buttons located on the selective button set may be pressed from outside of the housing. Formed across selective button set mounting opening

90 is button stopper 91 that limits the downward movement of buttons of selective button set 92, as shown in Figs. 3 and 4. Selective button set 92 may be constructed using first selective button 94, second selective button 96, resilient strips 98, 98', 100, 100', and connecting strip 102. First and second selective buttons 94 and 96 are symmetrically positioned in selective button set mounting opening 90 with button stopper 91 facing the lower surfaces of the adjacent parts of the two selective buttons 94 and 96, as shown in Fig. 5. The two resilient strips 98 and 98' are connected between first selective button 94 and connecting strip 102, and the other two resilient strips 100 and 100' are connected between second selective button 96 and connecting strip 102. The resilient strips serve to recover the selective buttons after they have been depressed by a user. Connecting strip 102 connects the selective button set with the housing. In the present embodiment, a plurality of protuberances, also referred to as a plurality of plugs in the claims, 106a, 106b, 106c, 106d are integrally formed on the inside of the housing and can be inserted into corresponding slots 104a, 104b, 104c, 104d that formed in connecting strip 102. The protuberances and slots may be firmly fastened by means of heating.

Referring to Fig. 5, to attach metal plate 60 to the inside of the housing, there are provided bosses 34 and lugs 36, 38, 40 on the inside of the housing around touch pad mounting opening 32. Lugs 36, 38, 40 are formed on the peripheral regions of the touch pad mounting opening 32 except the peripheral region where bosses 34 are formed. Lugs 36, 38, 40 respectively have hooks 37, 39, 41 formed facing the direction opposite to that of bosses 34. It is desirable to have at least three lugs. Metal plate 60 supports the touch pad 50 towards the touch pad mounting opening 32, fastened to the bosses 34 and lugs 36, 38, 40. To this end, the metal plate 60 includes concave receiving part 62,

fixing part 64, resilient part 66, first connecting part 68 and second connecting part 70. Receiving part 62 has cable aperture 72 for holding touch pad 50. Through cable aperture 72 is inserted a cable for connecting touch pad 50 with the electronic system. Fixing part 64 is extended from one side of receiving part 62 by a given interval, having slots 65 connected with bosses 34 by means of fasteners 86. Resilient part 66 is extended from the side of receiving part 62 opposite to fixing part 64 by a given interval, having slots 76 fastened to lugs 36 on the housing. Resilient part 66 is inclined by a given angle with respect to receiving part 62, as shown in Fig. 3, to impart a resiliency to the receiving part. First connecting part 68 has slots 74 fastened to lugs 38. Second connecting part 70 is extended from the side of receiving part 62 opposite to first connecting part 68, having slots or cuts 78 fastened to lugs 40. In addition, fixing and resilient parts 64 and 66 are provided with protuberances 82, 84 to assist the mounting of touch pad 50 to housing 30. Protuberances 82, 84 are formed adjacent to the sides of resilient part 62 towards touch pad 50. Also formed the inside of housing 30 adjacent to bosses 34 are further protuberances 42 to fasten to slots 80 formed in fixing part 64. Slots 80 and protuberances 42 are to facilitate the connection of fixing part 64 to the bosses.

The mounting of the touch pad on the inside of the housing, as shown in Figs. 6 through 8, starts with resilient part 66 of metal plate 60 being fastened to lugs 36 with slots 76 held by the hook of lug 36. At the same time, first and second connecting parts 68 and 70 are respectively connected to lugs 38 and 40. Then, pulling metal plate 60 towards bosses 34, fixing part 64 is securely placed on bosses 34 by means of slots 80 receiving protuberances 42. Finally fasteners 86 are turned through slots 65 of fixing part 64 into bosses 34.

Meanwhile, first and second selective buttons 94 and 96 of the selective button set 92 are inserted in selective button set mounting opening 90 while connecting strip 102 is connected to the inside of the housing by means of the slots 104a, 104b, 104c, 104d respectively holding plugs 106a, 106b, 106c, 106d. The slots and plugs may be firmly fastened with each other by the heat treatment usually called heat stake. Provided on the lower side of the selective button set 92 is a circuit board with switches that act cooperatively with the touch pad.

Referring to Figs. 9A and 9B, first and second selective buttons 94 and 96 serve as the left and right buttons of the mouse, and may be pressed separately or simultaneously. Pressing the first and second selective buttons after locating the pointer by touching the touch pad, the selective buttons 94 and 96 descends downwards. The descending movement of the buttons is limited by the button stopper 91. The position of the button stopper 91 may be determined according to the switches operated by the buttons 94 and 96.

Although this preferred embodiment of the present invention has been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims. It is also possible that other benefits or uses of the currently disclosed invention will become apparent over time.

What is Claimed is:

1. A device for mounting a touch pad in an electronic system, comprising:

a housing enclosing said electronic system;

said housing bearing an opening facilitating tactile access, from outside said housing, to said touch pad;

a touch pad supporting case attachable to an inner surface of said housing to securely position said touch pad in a position aligning said touch pad with said opening in said housing; and

said touch pad supporting case being formed of a metallic material and being free from plastic materials.

2. The device of claim 1, further comprising:

a plurality of lugs attached to said inner surface of said housing proximate to said opening; and

said touch pad supporting case bearing a plurality of slots receivably engaging said plurality of lugs to secure said touch pad supporting case to said inner surface of said housing.

3. The device of claim 2 further comprised of said touch pad supporting case being formed of stainless steel.

4. The device of claim 3, further comprised of said touch pad supporting case being

under one millimeter thick.

5. A device for mounting a touch pad in an electronic system, comprising:

a housing enclosing said electronic system and comprising:

said housing bearing a first opening facilitating tactile access, from outside said housing, to said touch pad; and

said housing bearing a second opening positioned operably proximate to said first opening;

a touch pad supporting case attachable to an inner surface of said housing to securely position said touch pad in a position aligning said touch pad with said opening in said housing;

said touch pad supporting case being formed of a metallic material and being free from plastic materials; and

a plurality of buttons attached to an inner surface of said housing and positioned to align said plurality of buttons with said second opening, said second opening facilitating tactile contact, from outside said housing, with said plurality of buttons, mounted inside said housing.

6. The device of claim 5, further comprising:

a plurality of lugs attached to said inner surface of said housing proximate to said first opening; and

said touch pad supporting case bearing a plurality of slots receiveably engaging said plurality of lugs to secure said touch pad supporting case to said inner surface of said housing.

7. The device of claim 6, further comprising a plurality of plugs formed on the inner surface of said housing operably proximate to said first opening.

8. The device of claim 7, further comprising a second plurality of slots formed on said plurality of buttons.

9. The device of claim 8, further comprised of said plurality of buttons are directly mounted in said second opening via said plurality of plugs being engaged with said second plurality of slots.

10. The device of claim 9, further comprising a button stopper attached proximate to said second opening to limit the downward movement of said plurality of buttons.

11. The device of claim 10 further comprised of said touch pad supporting case being formed of stainless steel.

12. The device of claim 11, further comprised of said touch pad supporting case being under one millimeter thick.

13. A device for mounting a touch pad in an electronic system, comprising:

a housing enclosing said electronic system and comprising:

said housing bearing a first opening facilitating tactile access, from outside said housing, to said touch pad;

a plurality of lugs attached to said inner surface of said housing proximate to said first opening; and

said housing bearing a second opening positioned operably proximate to said first opening;

a touch pad supporting case attachable to an inner surface of said housing to securely position said touch pad in a position aligning said touch pad with said opening in said housing;

said touch pad supporting case being formed of stainless steel, being free from plastic materials, being less than one millimeter thick, and bearing a plurality of slots receiveably engaging said plurality of lugs of said housing to secure said touch pad supporting case to said inner surface of said housing; and

a plurality of buttons attached to an inner surface of said housing and positioned to align said plurality of buttons with said second opening, said second opening facilitating tactile contact, from outside said housing, with said plurality of buttons, mounted inside said housing.

14. The device of claim 13, further comprising a plurality of plugs formed on the inner surface of said housing operably proximate to said first opening.

15. The device of claim 14, further comprising a second plurality of slots formed on said

plurality of buttons.

16. The device of claim 15, further comprised of said plurality of buttons are directly mounted in said second opening via said plurality of plugs being engaged with said second plurality of slots.

17. The device of claim 16, further comprising a button stopper attached proximate to said second opening to limit the downward movement of said plurality of buttons.

Abstract

A device for mounting a touch pad in an electronic system may be constructed using a touch pad supporting case that secures the touch pad to an inner surface of the housing that encloses the electronic system. The touch pad supporting case is made of a metallic material and is free from any plastics. This allows the touch pad unit to be thinner and lighter and avoids the need for performing a plating process on a plastic touch pad supporting case. This removes a safety hazard at manufacturing plants by avoiding exposing workers to the contaminants generated by the plating process.

Fig. 1

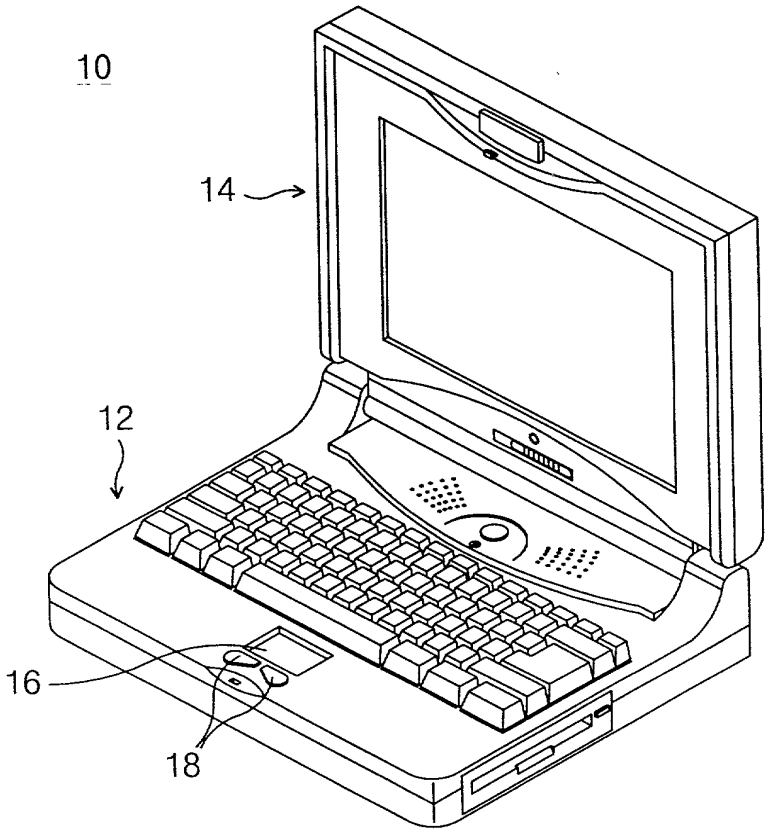

Fig. 2

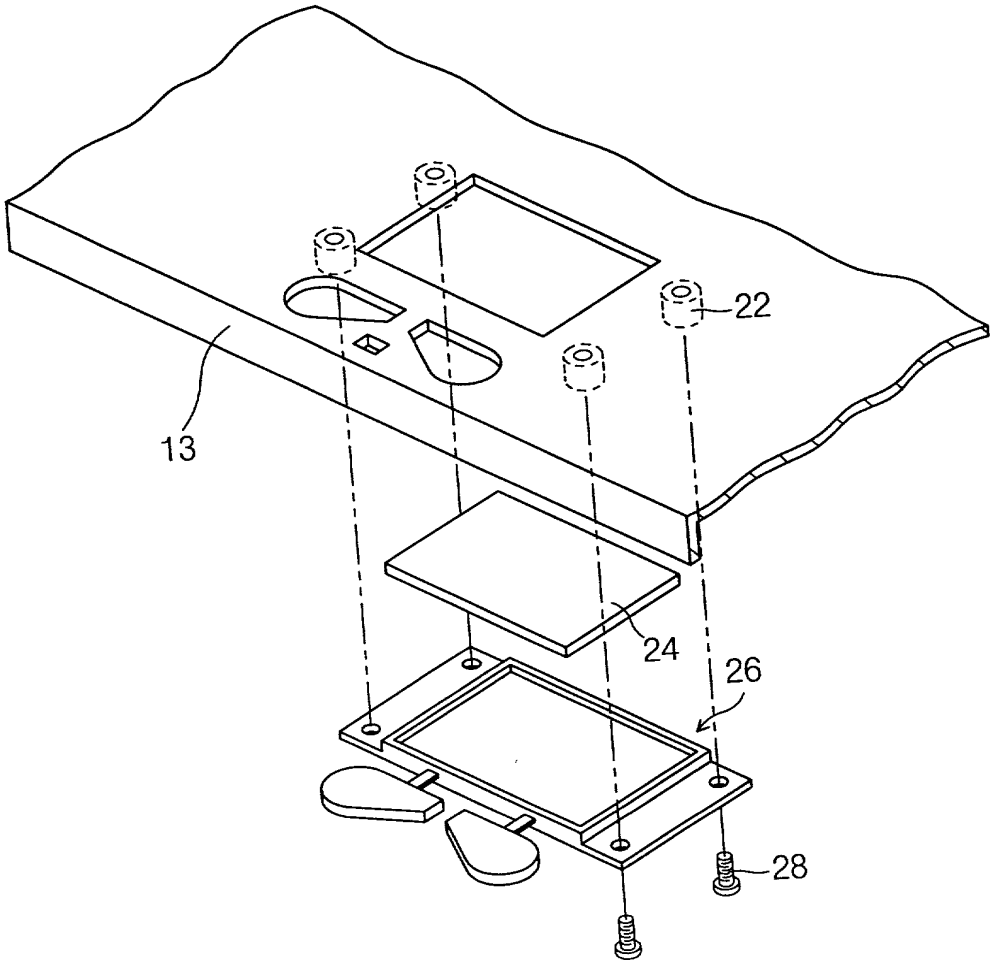

Fig. 3

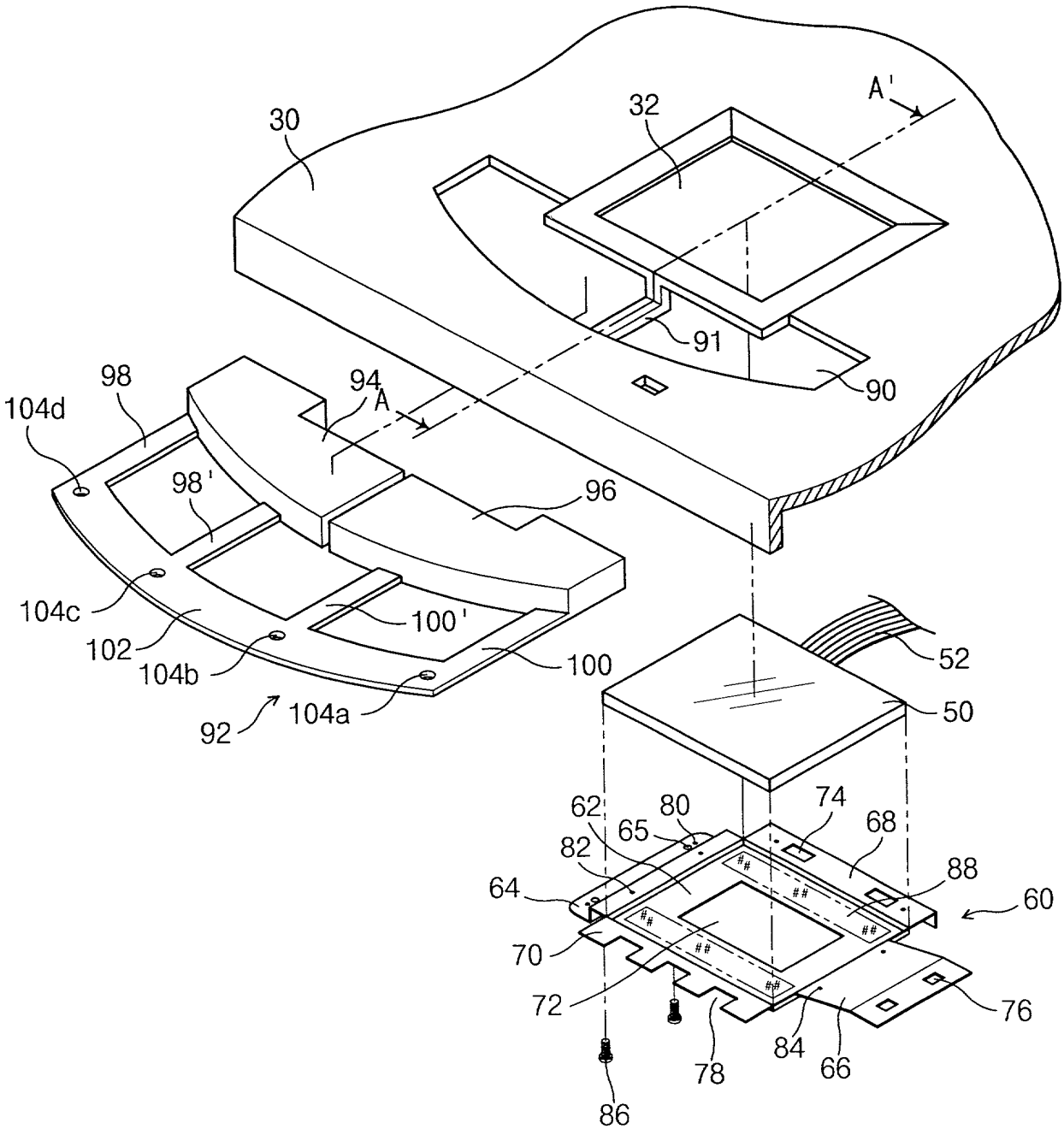
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Fig. 4

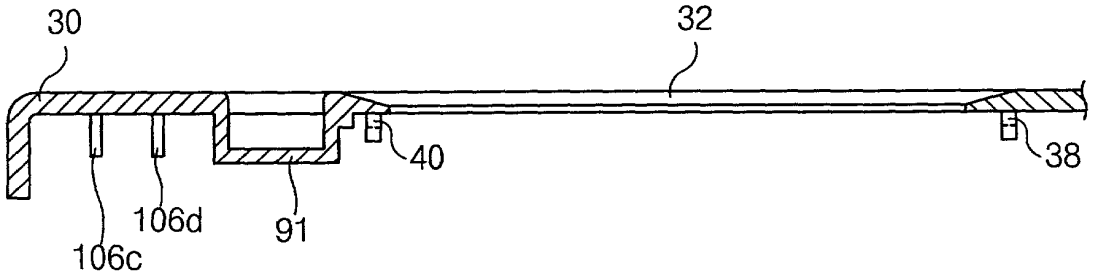


Fig. 9A

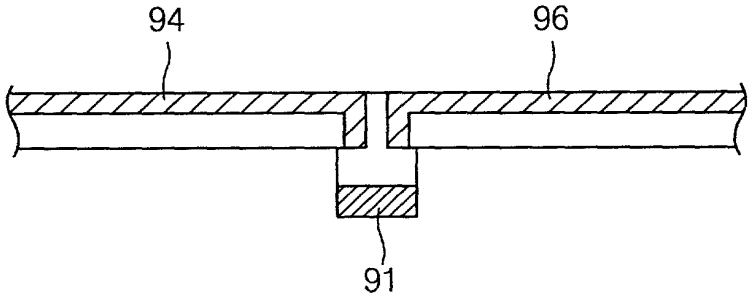


Fig. 9B

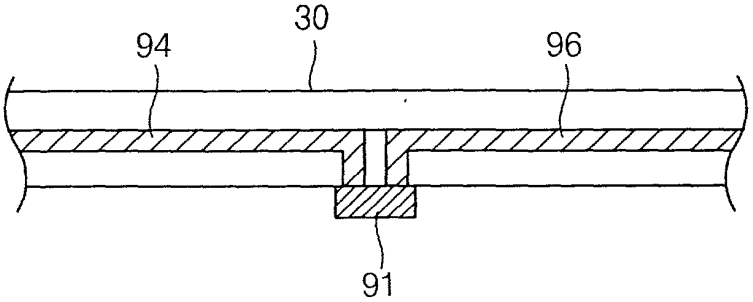


Fig. 5

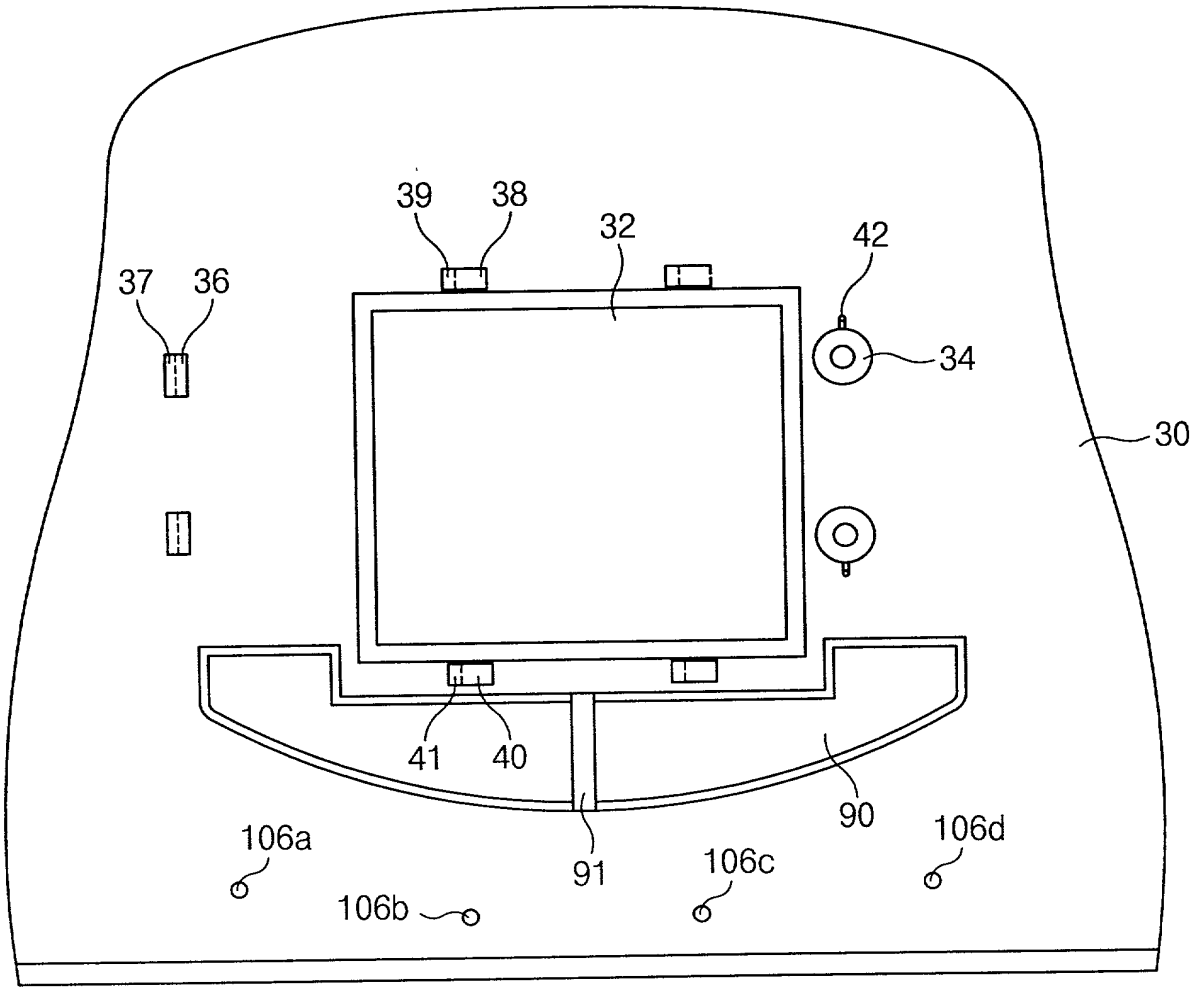
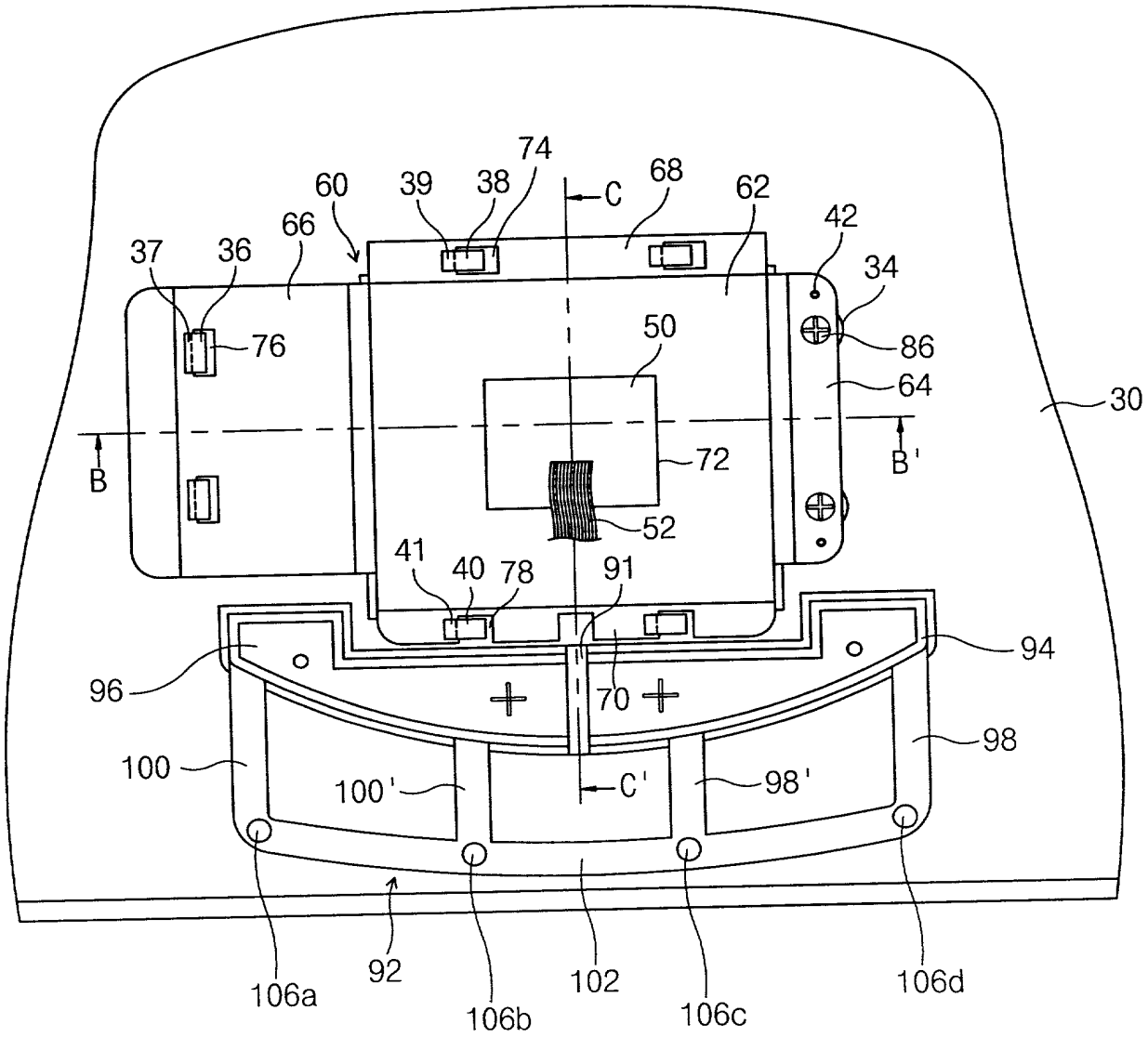


Fig. 6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106a
106b
102
106c
106d

Fig. 7

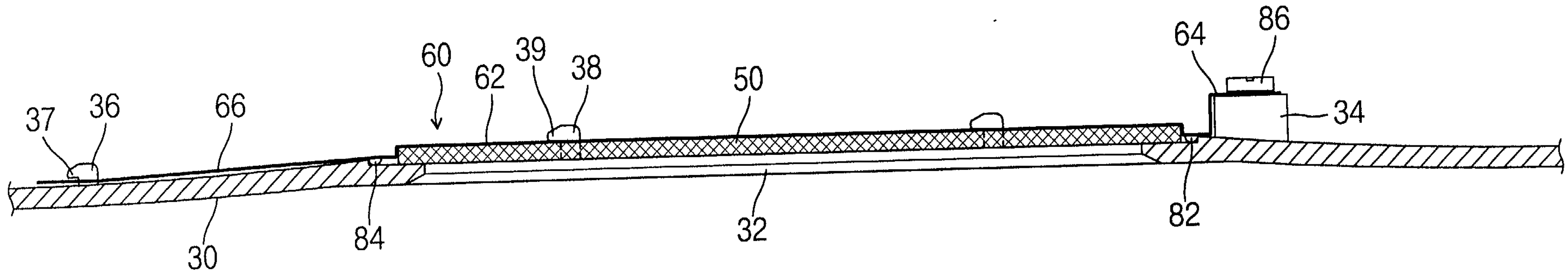
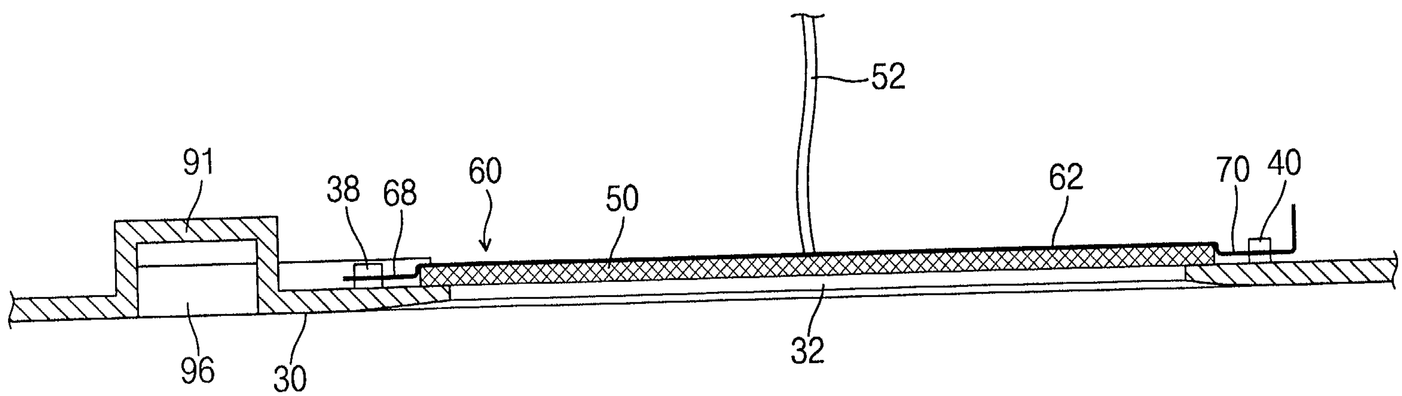

37
36
66
60
62
39
38
50
64
86
34
30
84
32
82

Fig. 8


52
91
38
68
60
50
62
70
40
96
30
32

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Jae-Yong BAE

Serial No:	*To be assigned*	Examiner:	*To be assigned*
Filed:	23 December 1998	Art Unit:	*To be assigned*

For: TOUCH PAD MOUNTING DEVICE FOR AN ELECTRONIC SYSTEM

TRANSMITTAL OF DECLARATION

The Honorable Commissioner
of Patents & Trademarks
Washington, D.C. 20231

Sir:

This transmittal accompanies an original Declaration for the above-referenced application.

Respectfully submitted,

Robert E. Bushnell,
Attorney for the Applicant
Reg. No.: 27,774

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Folio: P55492
Date: 12/23/98
I.D.: REB/mf

09264950 122398

PTO/SB/01 (6/95)

DECLARATION

Docket No. P55492

AS A BELOW NAMED INVENTOR, I hereby declare that:
My residence, post office address and citizenship are as stated next to my name.
I believe that I am the original, first and sole (if only one name is listed below), or an original, first and joint inventor (if plural names are listed below), of the subject matter which is claimed and for which a patent is sought on the invention entitled:

TITLE: *TOUCH PAD MOUNTING DEVICE FOR AN ELECTRONIC SYSTEM*

the specification of which either is attached hereto or otherwise accompanies this Declaration, or:

☐ was filed in the U.S. Patent & Trademark Office on _____ and assigned Serial No. _____.

☐ and (if applicable) was amended on _____.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose information which is material to patentability and to the examination of this application in accordance with Title 37 of the Code of Federal Regulations §1.56. I hereby claim foreign priority benefits under Title 35, U.S. Code §119(a)-(d) or §365(b) of any foreign application(s) for patent or inventor's certificate, or §365(a) of any PCT International application which designated at least one country other than the United States, or §119(e) of any United States provisional application(s), listed below and have also identified below any foreign applications for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

			Priority Claimed:
97-73686	KOREA	24 December 1997	Yes [X] No [ ]
(Application Number)	(Country)	(Day/Month/Year filed)	
			Yes [ ] No [ ]
(Application Number)	(Country)	(Day/Month/Year filed)	
			Yes [ ] No [ ]
(Application Number)	(Country)	(Day/Month/Year filed)	

I hereby claim the benefit under Title 35, U.S. Code, §120, of any United States application(s), or §365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application(s) in the manner provided by the first paragraph of Title 35, U.S. Code, §112, I acknowledge the duty to disclose information material to patentability as defined in Title 37, The Code of Federal Regulations, §1.56(a) which became available between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.)	(Filing Date)	(STATUS: patented, pending, abandoned)
(Application Serial No.)	(Filing Date)	(STATUS: patented, pending, abandoned)

I hereby revoke all previously granted powers of attorney and appoint the following attorneys: Robert E. Bushnell, Reg. No. 27,774, Michael D. Parker, Reg. No. 34,973, and Henry M. Zykorie, Reg. No. 27,477, to prosecute this application and to transact all business in the U.S. Patent & Trademark Office connected therewith and with any divisional, continuation, continuation-in-part, reissue or re-examination application, with full power of appointment and with full power to substitute an associate attorney or agent, and to receive all patents which may issue thereon, and request that all correspondence be addressed to:

Robert E. Bushnell,
Attorney-at-Law
Suite 300, 1522 "K" Street, N.W. **Payor No. 008439**
Washington, D.C. 20005-1202 Area Code: 202-638-5740

I HEREBY DECLARE that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 U.S. Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

FULL NAME OF FIRST OR SOLE INVENTOR: JAE-YONG BAE Citizenship: KOREA

Inventor's signature: JAE - YONG, BAE Date: 21. DEC. 1998

Residence & Post Office Address: 153-77, Maetanl-dong, Paldal-Ku, Suwon, Kyunggi-do, Republic of Korea

FULL NAME OF SECOND JOINT INVENTOR: _____ Citizenship: _____

Inventor's signature: _____ Date: _____

Residence & Post Office Address:

FULL NAME OF THIRD JOINT INVENTOR: _____ Citizenship: _____

Inventor's signature: _____ Date: _____

Residence & Post Office Address:

FULL NAME OF FOURTH JOINT INVENTOR: _____ Citizenship: _____

Inventor's signature: _____ Date: _____

Residence & Post Office Address:

☐ Additional inventors are being named on separately numbered sheets attached hereto.